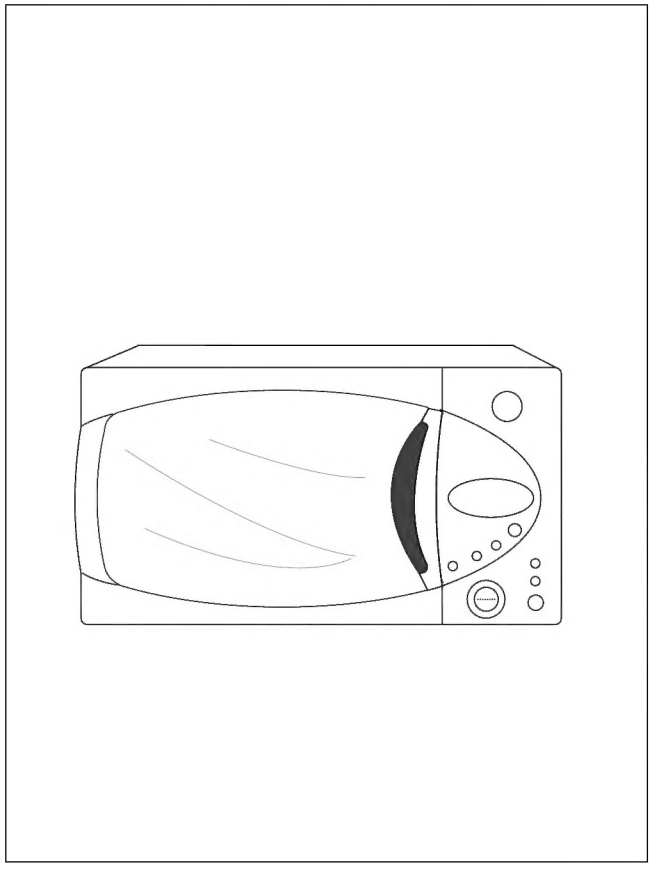
SAMSUNG

MICROWAVE OVEN

M1974R (WHITE)

SERVICE Manual

MICROWAVE OVEN



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PRECAUTIONS TO BE OBSERVED BEFORE AND DURING SERVICING TO AVOID POSSIBLE EXPOSURE TO EXCESSIVE MICROWAVE ENERGY

(a) Do not operate or allow the oven to be operated with the door open.

(b) Make the following safety checks on all ovens to be serviced before activating the magnetron or other microwave source, and make repairs as necessary:
(1) Interlock operation,
(2) proper door closing,
(3) seal and sealing surfaces (arcing, wear, and other damage),
(4) damage to or loosening of hinges and latches,
(5) evidence of dropping or abuse.

(c) Before turning on microwave power for any service test or inspection within the microwave generating compartments, check the magnetron, wave guide or transmission line, and cavity for proper alignment, integrity, and connections.

(d) Any defective or misadjusted components in the interlock, monitor, door seal, and microwave generation and transmission systems shall be repaired, replaced, or adjusted by procedures described in this manual before the oven is released to the owner.

(e) A Microwave leakage check to verify compliance with the Federal performance standard should be performed on each oven prior to release to the owner.

1. Precaution

Follow these special safety precautions. Although the microwave oven is completely safe during ordinary use, repair work can be extremely hazardous due to possible exposure to microwave radiation, as well as potentially lethal high voltages and currents.

1-1 Safety precautions (⚠)

1. All repairs should be done in accordance with the procedures described in this manual. This product complies with Federal Performance Standard 21 CFR Subchapter J (DHHS).

2. Microwave emission check should be performed to prior to servicing if the oven is operative.

3. If the oven operates with the door open : Instruct the user not to operate the oven and contact the manufacturer and the center for devices and radiological health immediatly.

4. Notify the Central Service Center if the microwave leakage exceeds 5 mW/cm^2

5. Check all grounds.

6. Do not power the MWO from a "2-prong" AC cord. Be sure that all of the built-in protective devices are replaced. Restore any missing protective shields.

7. When reinstalling the chassis and its assemblies, be sure to restore all protective devices, including: nonmetallic control knobs and compartment covers.

8. Make sure that there are no cabinet openings through which people--particularly children--might insert objects and contact dangerous voltages. Examples: Lamp hole, ventilation slots.

9. Inform the manufacturer of any oven found to have emmission in excess of 5 mW/cm^2, Make repairs to bring the unit into compliance at no cost to owner and try to determine cause.
   Instruct owner not to use oven until it has been brought into compliance.

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10. Service technicians should remove their watches while repairing an MWO.

11. To avoid any possible radiation hazard, replace parts in accordance with the wiring diagram. Also, use only the exact replacements for the following parts: Primary and secondary interlock switches, interlock monitor switch.

12. If the fuse is blown by the Interlock Monitor Switch: Replace all of the following at the same time: Primary, door sensing switch and power relay, as well as the Interlock Monitor Switch. The correct adjustment of these switches is described elsewhere in this manual. Make sure that the fuse has the correct rating for the particular model being repaired.

13. Design Alteration Warning:
    Use exact replacement parts only, i.e., only those that are specified in the drawings and parts lists of this manual. This is especially important for the Interlock switches, described above. Never alter or add to the mechanical or electrical design of the MWO. Any design changes or additions will void the manufacturer's warranty.10.Always unplug the unit's AC power cord from the AC power source before attempting to remove or reinstall any component or assembly.

14. Never defeat any of the B+ voltage interlocks. Do not apply AC power to the unit (or any of its assemblies) unless all solid-state heat sinks are correctly installed.

15. Some semiconductor ("solid state") devices are easily damaged by static electricity. Such components are called Electrostatically Sensitive Devices (ESDs). Examples include integrated circuits and field-effect transistors.

    Immediately before handling any semiconductor components or assemblies, drain the electrostatic charge from your body by touching a known earth ground.

16. Always connect a test instrument's ground lead to the instrument chassis ground *before* connecting the positive lead; always remove the instrument's ground lead last.

1-2 Special Servicing Precautions (Continued)

17. When checking the continuity of the witches or transformer, always make sure that the power is OFF, and one of the lead wires is disconnected.
18. Components that are critical for safety are indicated in the circuit diagram by shading, ⚠ or ⚠ .
19. Use replacement components that have the same ratings, especially for flame resistance and dielectric strength specifications. A replacement part that does not have the same safety characteristics as the original might create shock, fire or other hazards.

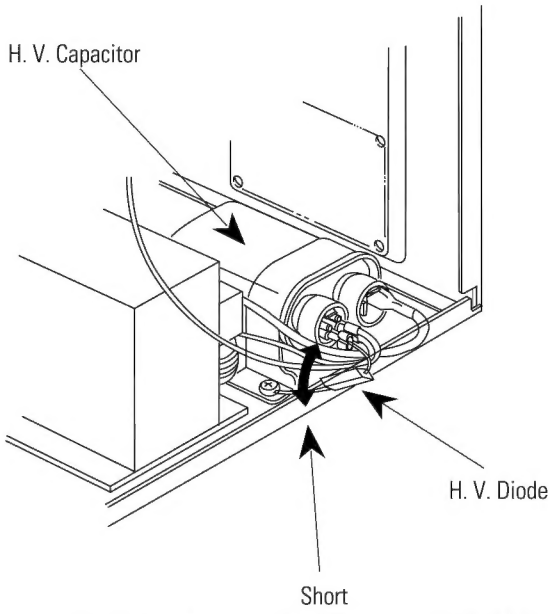
1-3 Special High Voltage Precautions

1. High Voltage Warning
   Do not attempt to measureany of the high voltages--this includes the filament voltage of the magnetron. High voltage is present during any cook cycle.

   Before touching any components or wiring, always unplug the oven and discharge the high voltage capacitor (See Figure 1-1)

2. The high-voltage capacitor remains charged about 30 seconds after disconnection. Short the negative terminal of the high-voltage capacitor to to the oven chassis. (Use a screwdriver.)

3. High voltage is maintained within specified limits by close-tolerance, safety-related components and adjustments. If the high voltage exceeds the specified limits, check each of the special components.



⚠ Touch chassis ground first then short to the high voltage capacitor terminal by using screwdriver or jumper wire.

Fig. 1-1. Discharging the High Voltage Capacitor

PRECAUTION

There exists HIGH VOLTAGE ELECTRICITY with high current capabilities in the circuits of the HIGH VOLTAGE TRANSFORMER secondary and filament terminals. It is extremely dangerous to work on or near these circuits with the oven energized.
DO NOT measure the voltage in the high voltage circuit including filament voltage of magnetron.

PRECAUTION

Never touch any circuit wiring with your hand nor with uninsulated tool during operation.

PRECAUTION

Servicemen should remove their watches whenever working close to or replacing the magnetron.

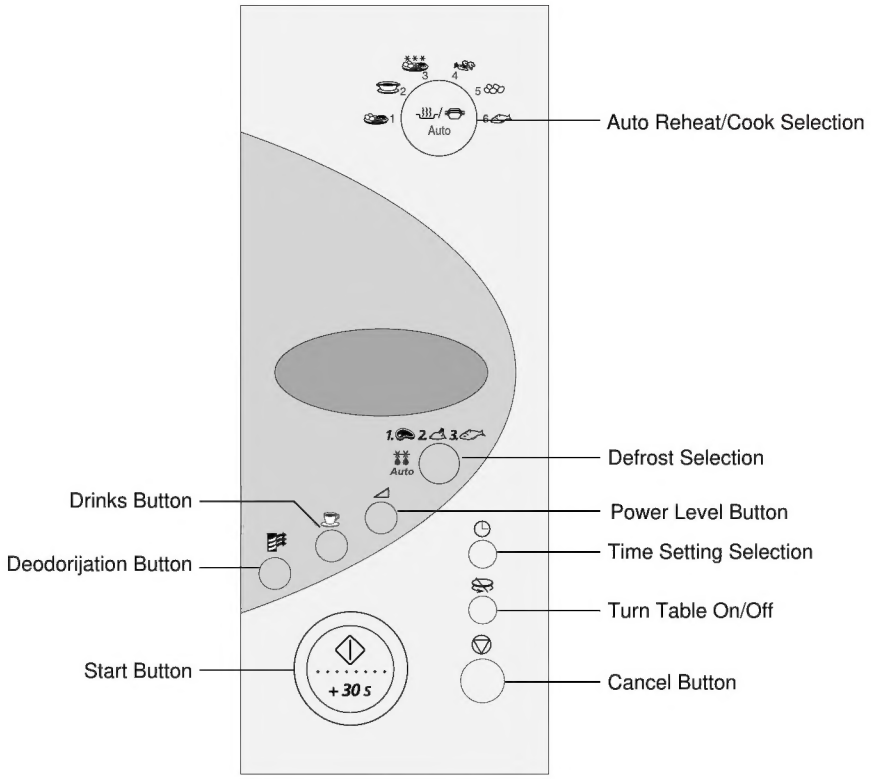
2. Specifications

2-1 Table of Specifications

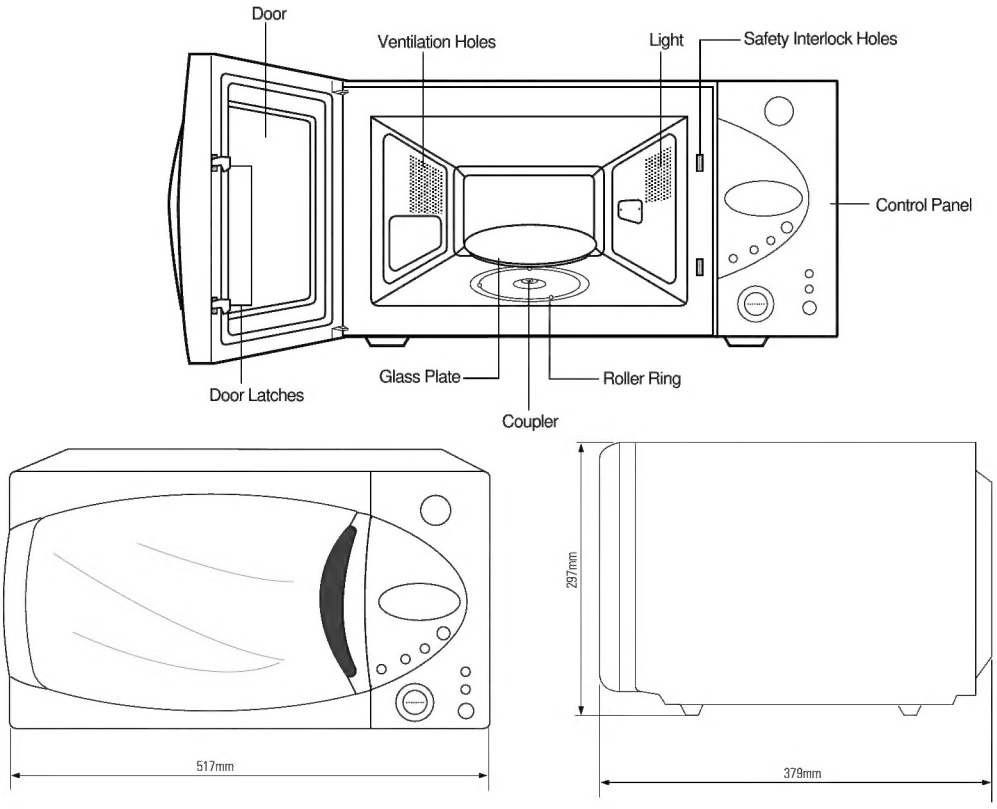
TIMER	99 MINUTES
POWER SOURCE	230V 50Hz, AC
POWER CONSUMPTION	MICROWAVE : 1,400W
OUTPUT POWER	FROM 100 TO 1000W
	(IEC-705 TEST PROCEDURE)
OPERATING FREQUENCY	2,450MHz
MAGNETRON	OM75PH(31)
COOLING METHOD	COOLING FAN MOTOR
OUTSIDE DIMENSIONS	517(W) x 297(H) x 399(D)

3. Operating Instructions

3-1 Control Panel



3-2 Features & External Views



4. Disassembly and Reassembly

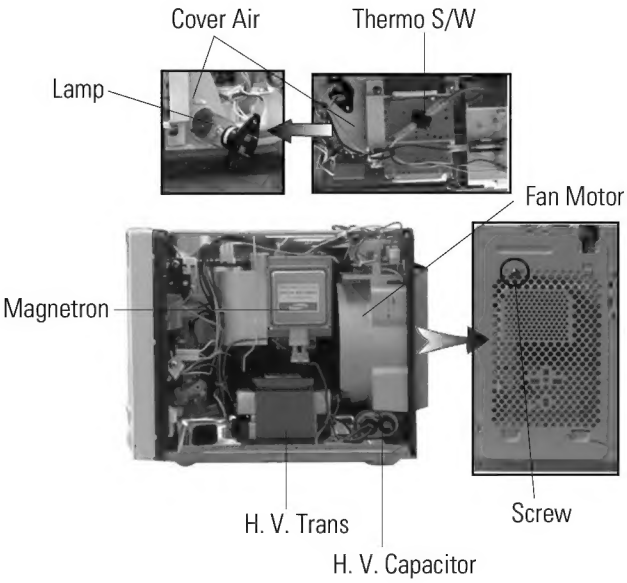
4-1 Replacement of Magnetron, Motor Assembly and Lamp

Remove the magnetron including the shield case, permanent magnet, choke coils and capacitors (all of which are contained in one assembly).

1. Disconnect all lead wires from the magnetron and lamp.
2. Remove a screw securing the magnetron supporter.
3. Remove the magnetron supporter.
4. Remove the air cover.
5. Remove screws securing the magnetron to the wave guide.
6. Take out the magnetron very carefully.
7. Remove screws from the back panel.
8. Take out the fan motor.
9. Remove the oven lamp by rotating to pull out from hole of air cover.

NOTE1: When removing the magnetron, make sure that its antenna does not hit any adjacent parts, or it may be damaged.

NOTE2: When replacing the magnetron, be sure to remount the magnetron gasket in the correct position and make sure the gasket is in good condition.



4-1 Replacement of High Voltage Transformer

1. Discharge the high voltage capacitor.
2. Disconnect all the leads.
3. Remove the mounting bolts.
4. Reconnect the leads correctly and firmly.

PRECAUTION

Servicemen should remov their watches whenever working close to or replacing the magnetron.

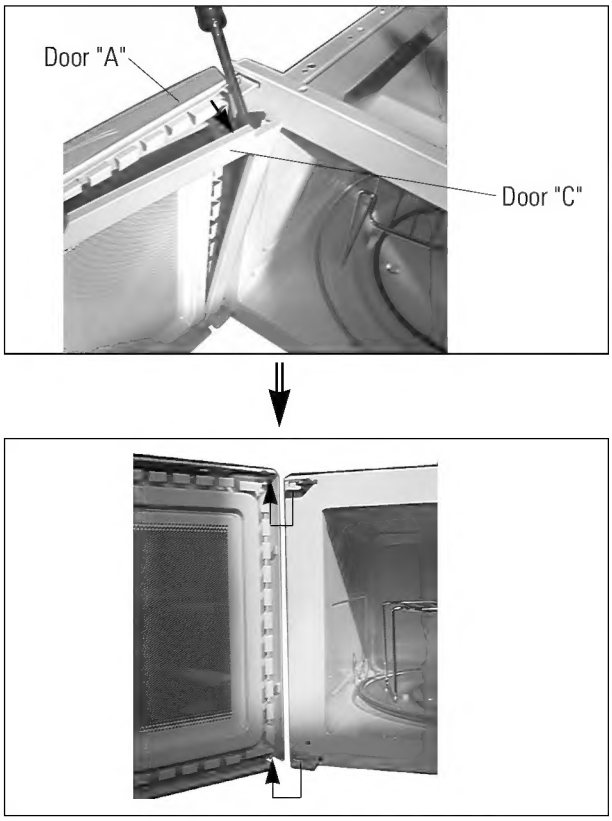
PRECAUTION

There exists HIGH VOLTAGE ELECTRICITY with high current capabilities in the circuits of the HIGH VOLTAGE TRANSFORMER secondary and filament terminals. It is extremely dangerous to work on or near these circuits with the oven energized.
DO NOT measure the voltage in the high voltage circuit including filament voltage of magnetron.

4-3 Replacement of Door Assembly

4-3-1 Removal of Door "C"

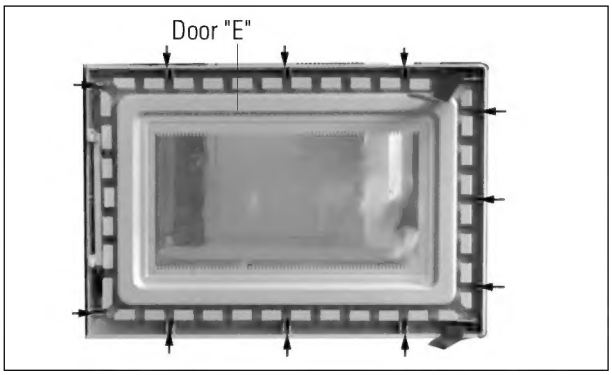
Insert flat screwdriver into the gap between Door "A" and Door "C" to remove Door "C". Be careful when handling Door "C" because it is fragile.
Then remove the door assembly.



4-3-2 Removal of Door "E"

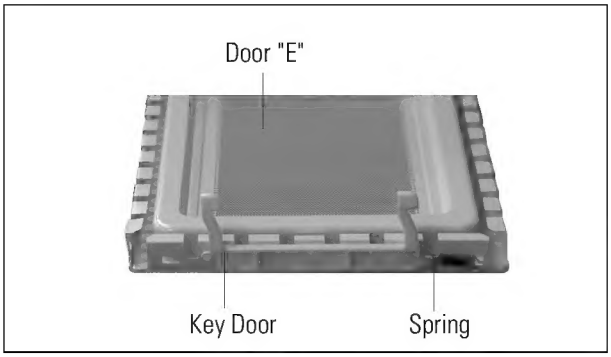
Following the procedure as shown in the figure, insert and bend a thin metal plate between Door "E" and Door "A" until you hear the 'tick' sound.

- Insertion depth of the thin metal plate should be 0.5mm or less.



4-3-3 Removal of Key Door & Spring

Remove pin hinge from Door "E"
Detach spring from Door "E" and key door.



4-3-5 Reassembly Test

After replacement of the defective component parts of the door, reassemble it and follow the instructions below for proper installation and adjustment so as to prevent an excessive microwave leakage.

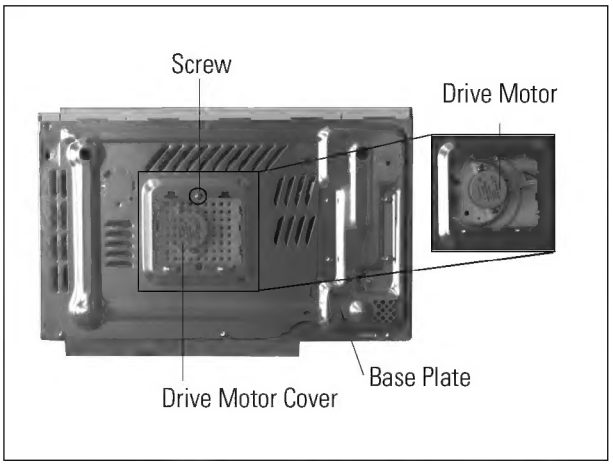
1. When mounting the door to the oven, be sure to adjust the door parallel to the bottom line of the oven face plate by moving the upper hinge and lower hinge in the direction necessary for proper alignment.
2. Adjust so that the door has no play between the inner door surface and oven front surface. If the door assembly is not mounted properly, microwave energy may leak from the space between the door and oven.
3. Do the microwave leakage test.

4-4 Replacement of Fuse

1. Disconnect the oven from the power source.
2. When 15A fuse blows out by the operation of interlock monitor switch failure, replace the primary interlock switch, door sensing switch, monitor switch and power relay.
3. When the above three switches operate properly, check if any other part such as the control circuit board, blower motor or high voltage transformer is defective.

4-5 Replacement of Drive Motor

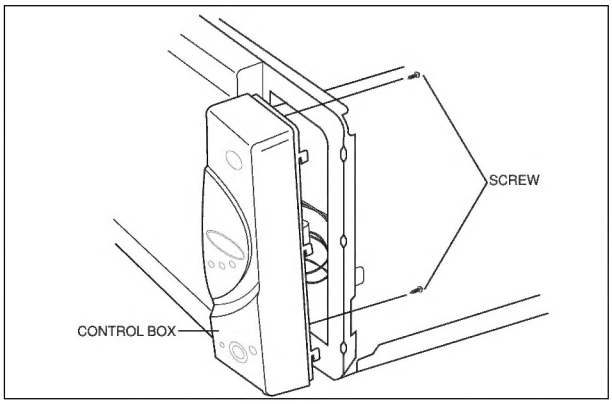
1. Take out the glass tray, guide roller and coupler from cavity.
2. Turn the oven upside down to replace the drive motor.
3. Remove a screw securing the drive motor cover.
4. Disconnect all the lead wires from the drive motor.
5. Remove screws securing the drive motor to the cavity.
6. Remove the drive motor.
7. When replacing the drive motor, be sure to remount it in the correct position.
8. Connect all the leads to the drive motor.
9. Screw the deive motor cover to the base plate with a screw driver.
10. Remount the coupler in the correct position.



4-6 Replacement of Control Circuit Board

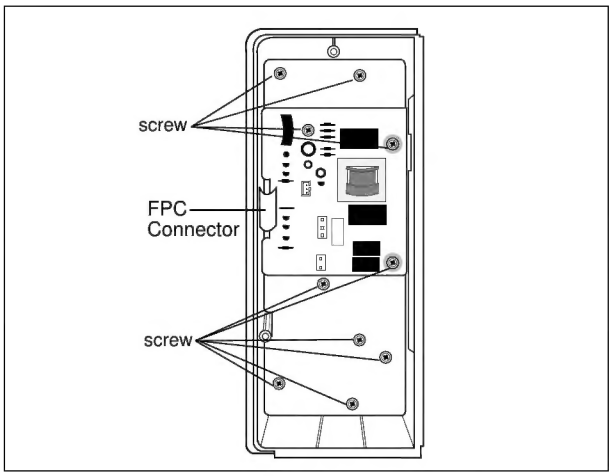
4-6-1 Removal of Ass'y Control Box

1. Be sure to ground any static electric charge in your body and never touch the touch control circuitry.
2. Disconnect the connectors from the control circuit board.
3. Remove screws securing the control box assembly.
4. Remove the screw securing the ground tail of the keyboard.



4-6-2 Remonal of Ass'y P.C.B

1. Pull the lever end of the plastic fastener and remove the Flexible Printed Circuit(FPC) of membrane panel.
2. Remove screws securing the control circuit board.
3. Lift up the control circuit board from the Ass'y control box.
4. When reconnecting the FPC connector, make sure that the holes on the connector are properly engaged with the hooks on the Plastic Fastener.



5. Alignment and Adjustments

PRECAUTION

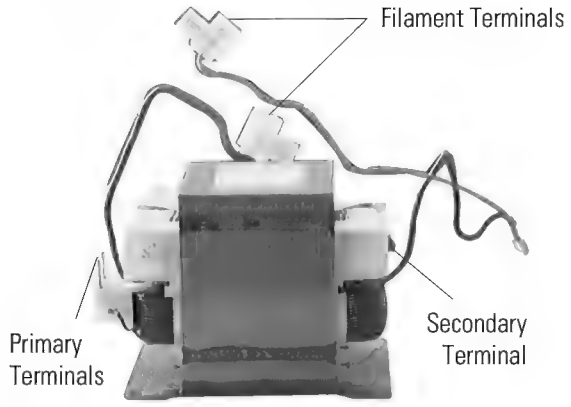
1. High voltage is present at the high voltage terminals during any cook cycle.
2. It is neither necessary nor advisable to attempt measurement of the high voltage.
3. Before touching any oven components or wiring, always unplug the oven from its power source and discharge the high voltage capacitor.

5-1 High Voltage Transformer

1. Remove connectors from the transformer terminals and check continuity.
2. Normal resistance readings are as follows:

Secondary	Approx. 100Ω
Filament	Approx.0Ω
Primary	Approx.1.450Ω

(Room temperature = 20°C)



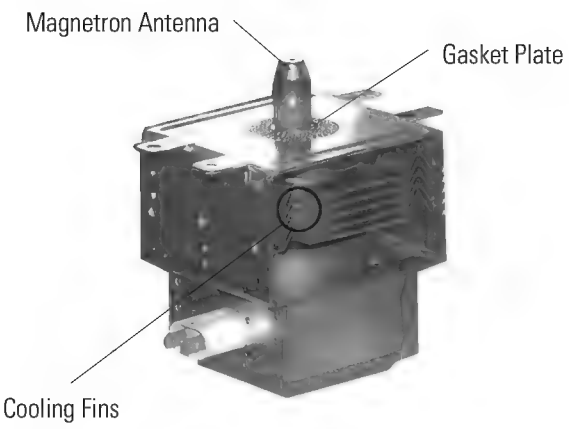
5-2 Low Voltage Transformer

1. The low voltage transformer is located on the control circuit board.
2. Remove the low voltage transformer from the PCB Ass'y and check continuity.
3. Normal resistor reading is shown in the table.

Terminals	Resistance
1~2(Input)	1,000Ω
3~4(Output 2.9V)	3.947Ω
5~6(Output13V)	2.117Ω

5-3 Magnetron

1. Continuity checks can indicate only an open filament or a shorted magnetron. To diagnose an open filament or shorted magnetron :
2. Isolate the magnetron from the circuit by disconnecting its leads.
3. A continuity check across the magnetron filament terminals should indicate one ohm or less.
4. A continuity check between each filament terminal and magnetron case should read open.



5-4 High Voltage Capacitor

1. Check continuity of the capacitor with the meter set at the highest resistance scale.
2. Once the capacitor is charged, a normal capacitor shows continuity for a short time, and then indicates 9MΩ.
3. A shorted capacitor will show continuous continuity.
4. An open capacitor will show constant 9MΩ.
5. Resistance between each terminal and chassis should read infinite.

5-5 High Voltage Diode

1. Isolate the diode from the circuit by disconnecting its leads.
2. With the ohm-meter set at the highest resistance scale, measure across the diode terminals. Reverse the meter leads and read the resistance. A meter with 6V, 9V or higher voltage batteries should be used to check the front-to back resistance of the diode (otherwise an infinite resistance may be read in both directions). The resistance of a normal diode will be infinite in one direction and several hundred KΩ in the other direction.

5-6 Main Relay and Power Control Relay

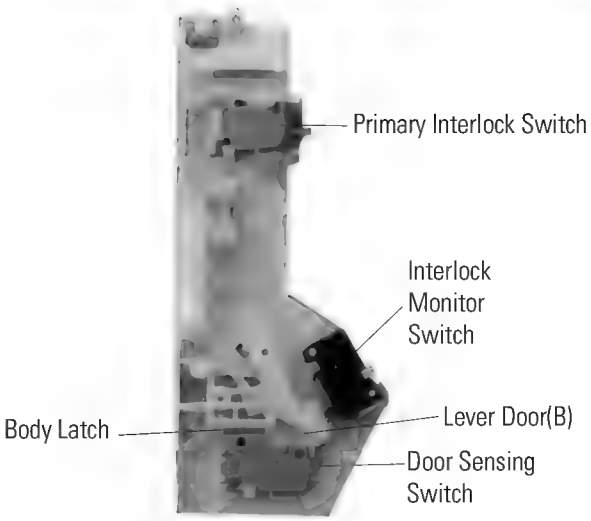
1. The relays are located on the PCB Ass'y. Isolate them from the main circuit by disconnecting the leads.
2. Operate the microwave oven with a water load in the oven. Set the power level set to high.
3. Check continuity between terminals of the relays after the start pad is pressed.

5-7 Adjustment of Primary Switch, Door Sensing Switch and Monitor Switch

Precaution

For continued protection against radiation hazard, replace parts in accordance with the wiring diagram and be sure to use the correct part number for the following switches: Primary and secondary interlock switches, and the interlock monitor switch (replace all together). Then follow the adjustment procedures below. After repair and adjustment, be sure to check the continuity of all interlock switches and the interlock monitor switch.

1. When mounting Primary switch and Interlock Monitor switch to Latch Body, consult the figure.
2. No specific adjustment during installation of Primary switch and Monitor switch to the latch body is necessary.
3. When mounting the Latch Body to the oven assembly, adjust the Latch Body by moving it so that the oven door will not have any play in it. Check for play in the door by pulling the door assembly. Make sure that the latch keys move smoothly after adjustment is completed. Completely tighten the screws holding the Latch Body to the oven assembly.
4. Reconnect to Monitor switch and check the continuity of the monitor circuit and all latch switches again by following the components test procedures.
5. Confirm that the gap between the switch housing and the switch actuator is no more than 0.5mm when door is closed.



	Door Open	Door Closed
Primary switch	∞	0
Monitor switch (COM-NC)	0	∞
Monitor switch (COM-NO)	∞	0
Door Sensing S/W	∞	0

5-8 Output Power of Magnetron

CAUTION
MICROWAVE RADIATION

PERSONNEL SHOULD NOT ALLOW EXPOSURE TO MICROWAVE RADIATION FROM MICROWAVE GENERATOR OR OTHER PARTS CONDUCTING MICROWAVE ENERGY.

The output power of the magnetron can be measured by performing a water temperature rise test.

Equipment needed :

* Two 1-liter cylindrical borosilicate glass vessel (Outside diameter 190 mm)
* One glass thermometer with mercury column

NOTE: Check line voltage under load. Low voltage will lower the magnetron output. Make all temperature and time tests with accurate equipment.

1. Fill the one liter glass vessel with water.
2. Stir water in glass vessel with thermometer, and record glass vessel's temperature ("T1", 10±1℃).
3. After moving the water into another glass vessel, place it in the center of the cooking tray. Set the oven to high power and operate for 44 seconds exactly. (3 seconds included as a holding time of magnetron oscillation:)
4. When heating is finished, stir the water again with the thermometer and measure the temperature ("T2").
5. Subtract T1 from T2. This will give you the water temperature rise. (ΔT)
6. The output power is obtained by the following formula;

$$\text{Output Power} = \frac{4.187 \times 1000 \times \Delta T}{41}$$

41 : Heating Time (sec)
4.187 : Coefficient for Water
1000 : Water (cc)
ΔT : Temperature Rise (T2-T1)

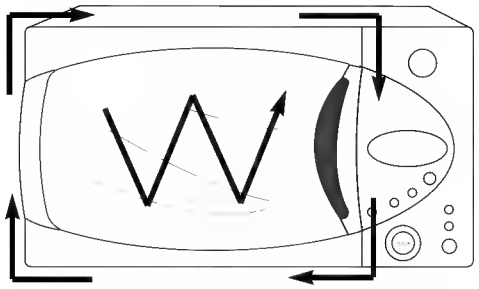
* Output (W) = 100 x ΔT

7. Normal temperature rise for this model is 9℃ to 11℃ at 'HIGH'.

NOTE 1 : Variations or errors in the test procedure will cause a variance in the temperature rise. Additional power test should be made if temperature rise is marginal.

NOTE 2 : Output power in watts is computed by multiplying the temperature rise (step E) by a factor of 91 times the of centigrade temperature.

5-9 Procedure for Measurement of Microwave Energy Leakage

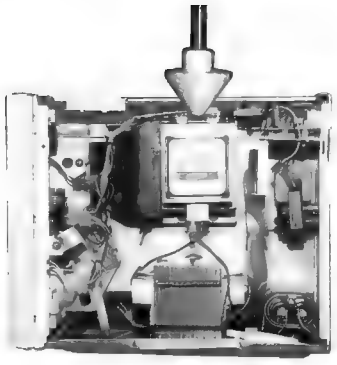


1) Pour 275±15cc of 20±5℃(68±9℉) water in a beaker which is graduated to 600cc, and place the beaker in the center of the oven.
2) Start to operate the oven and measure the leakage by using a microwave energy survey meter.
3) Set survey meter with dual ranges to 2,450MHz.
4) When measuring the leakage, always use the 2 inch spacer cone with the probe. Hold the probe perpendicular to the cabinet door. Place the spacer cone of the probe on the door and/or cabinet door seam and move along the seam, the door viewing window and the exhaust openings moving the probe in a clockwise direction at a rate of 1 inch/sec. If the leakage testing of the cabinet door seam is taken near a corner of the door, keep the probe perpendicular to the areas making sure that the probe end at the base of the cone does not get closer than 5cm to any metal. If it gets closer than 5cm, erroneous readings may result.
5) Measured leakage must be less than 4mW/cm^2, after repair or adjustment.

> Maximum allowable leakage is 5mW/cm^2.
> 4mW/cm^2 is used to allow for measurement and meter accuracy

5-10 Check for Microwave Leakage

1. Remove the outer panel.
2. Pour 275±15cc of 20±5℃(68±9℉) water in a beaker which is graduated to 600cc, and place the beaker in the center of the oven.
3. Start the oven at the highest power level.
4. Set survey meter dual ranges to 2,450MHz.
5. Using the survey meter and spacer cone as described above, measure arnear the opening of magnetron, the surface of the air guide and the surface of the wave guide as shown in the following photo.(but avoid the high voltage components.) The neading should be less than 4mW/cm^2.



5-11 Note on Measurement

1) Do not exceed the limited scale.
2) The test probe must be held on the grip of the handle, otherwise a false reading may result when the operator's hand is between the handle and the probe.
3) When high leakage is suspected, do not move the probe horizontally along the oven surface; this may cause damage to the probe.
4) Follow the recommendation of the manufacturer of the microwave energy survey meter.

5-12 Leakage Measuring Procedure

5-12-1 Record keeping and notification after measurement
1) After adjustment and repair of a radiarion preventing device, make a repair record for the measured values, and keep the data.
2) If the radiation leakage is more than 4 mW/cm^2 after determining that all parts are in good condition, functioning properly and the identical parts are replaced as listed in this manual notift that fact to ;

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5-12-2 At least once a year have the microwave energy survey meter checked for accuracy by its manufacturer.

6. Troubleshooting

PRECAUTION

1. CHECK GROUNDING BEFORE CHECKING FOR TROUBLE.
2. BE CAREFUL OF THE HIGH VOLTAGE CIRCUIT.
3. DISCHARGE THE HIGH VOLTAGE CAPACITOR.
4. WHEN CHECKING THE CONTINUITY OF THE SWITCHES OR TRANSFORMER, DISCONNECT ONE LEAD WIRE FROM THESE PARTS AND THEN CHECK CONTINUITY WITHOUT THE POWER SOURCE ON. TO DO OTHERWISE MAY RESULT IN A FALSE READING OR DAMAGE TO YOUR METER.
5. DO NOT TOUCH ANY PART OF THE CIRCUIT OR THE CONTROL CIRCUIT BOARD, SINCE STATIC DISCHARGE MAY DAMAGE IT. ALWAYS TOUCH GROUND WHILE WORKING ON IT TO DISCHARGE ANY STATIC CHARGE BUILT UP.

6-1 Electrical Maltunction

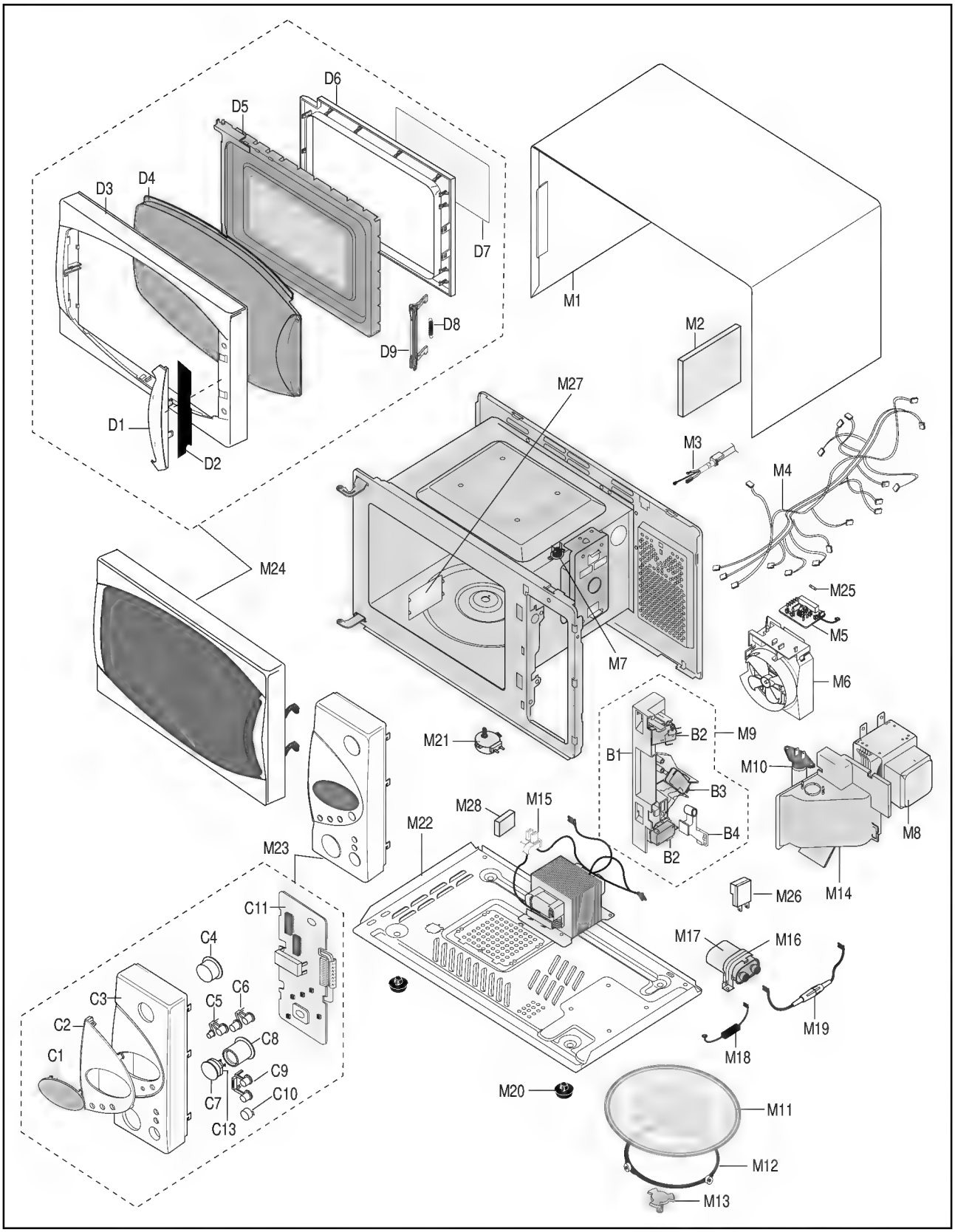
SYMPTOM	CAUSE	CORRECTIONS
Oven is dead. Fuse is OK. No display and no operation at all.	1. Open or loose lead wire harness 2. Open thermal cutout (Magnetron) 3. Open low voltage transformer 4. Defective Ass'y PCB	Check fan motor when thermal cutout is defective. Check Ass'y PCB when LVT is defective.
No display and no operation at all. Fuse is blown.	1. Shorted lead wire harness 2. Defective primary latch switch (NOTE 1) 3. Defective monitor switch (NOTE1) 4. Shorted HVCapacitor 5. Shorted HVTransformer (NOTE2)	Check adjustment of primary, interlock monitor, power relay, door sensing switch.
	NOTE 1: All of these switches must be replaced at the same time. (refer to adjustment instructions) Check continuity of power relay contacts and if it has continuity, replace power relay also. NOTE 2: When HVTransformer is replaced, check diode and magnetron also.	
Oven does not accept key input (Program)	1. Key input is not in-Sequence 2. Open or loose connection of membrane key pad to Ass'y PCB 3. Shorted or open membrane panel 4. Defective Ass'y PCB	Refer to operation procedure. Replace PCB main.
Timer starts countdown but no microwave oscillation. (No heat while oven lamp and fan motor turn on.)	1. Off-alignment of latch switches 2. Open or loose connection of high voltage circuit especially magnetron filament circuit NOTE: Large contact resistance will bring lower magnetron filament voltage and cause magnetron to lower output and/or intermittent oscillation. 3. Defective high voltage components H.V.Transformer H.V.Capacitor H.V.Diode, H.V.Fuse Magnetron 4. Open or loose wiring of power relay 5. Defective primary latch switch 6. Defective power relay or Ass'y PCB	Adjust door and latch switches. Check high voltage component according to component test procedure and replace if it is defective. Replace PCB main.

6-1 Electrical Maltunction(continved)

SYMPTOM	CAUSE	CORRECTIONS
Oven lamp and fan motor turn on	1. Misadjustment or loose wiring of primary latch switch 2. Defective primary latch switch	Adjust door and latch switches.
Oven can program but timer does not start.	1. Open or loose wiring of secondary interlock switch 2. Off-alignment of primary interlock 3. Defective secondary interlock S/W	Adjust door and interlock switches.
Microwave output is low;. Oven takes longer time to cook food.	1. Decrease in power source voltage. 2. Open or loose wiring of magnetron filament circuit. (Intermittent oscillation)) 3. Aging of magnetron	Consult electrician.
Fan motor turns on when plugged in	Loose wiring of door sensing switch	Check wire of door sensing switch.
Oven does not operate and return to the plugged in mode.	Defective Ass'y PCB	Replace PCB main.
Loud buzzing noise can be heard.	1. Loose fan and fan motor 2. Loose screws on H.V.Transformer 3. Shorted H.V.Diode	Tighten screws of fan motor. Tighten screws of H.V.Transformer. Replace H.V.Diode.
Turntable motor does not rotate.	1. Open or loose wiring of turntable motor. 2. Defective turntable motor.	Replace turntable motor.
Oven stops operation during cooking	1. Open or loose wiring of primary interlock switch 2. Operation of thermal cutout(Magnetron)	Adjust door and latch switches.
Sparks	1. Metallic ware or cooking dishes touching on the oven wall. 2. Ceramic ware trimmed with gold or silver powder also causes sparks.	Inform the customer. Do not use any type of cookware with metallic trimming.
Uneven cooking	Uneven intensity of microwave due to its characteristics.	Wrap thinner parts of the food with aluminum foil. Use plastic wrap or cover with a lid. Stir once or twice while cooking foods such as soup, cocoa, or milk.
Noise from the turntable motor when it starts to operate.	Noise may result from the motor.	Replace turntable motor.

7. Exploded Views and Parts List

7-1 Exploded Views



7-2 Main Parts List

Ref. No.	Parts No.	Description	Specification	Q'ty	Remarks
M 1	DE70-00011A	PANEL-OUTER	3RD-1.0	1	
M 2	DE63-90035G	CUSHION-RUBBER	DFA20,T2,W190,L100,BLK	1	
M 3	DE39-20145C	ASSY POWER CORD	EP-48 1.0,-,-,-,-,GRY	1	
M 4	DE39-00055A	WIRE HARNESS-A	230V50HZ,INRUSH,I-TCO,-,M1974,FISH2	1	
M 5	DE96-00007A	ASSY NOISE FILTER	SN-3WEA,250V10A,3W INRUSH TC	1	
M 6	DE31-00002B	ASSY-MOTOR FAN	SMF-3RDEA1,-,230V50HZ,2350RPM,CE2933	1	
M 7	DE47-20173A	THERMOSTAT	PW-2N(90/60)30,187Y,250V7.5A,9	1	
M 8	OM75PH(31)ESS	ASSY-MAGNETRON	OM75PH(31)ESS	1	⚠
M 9	DE93-20020E	ASSY BODY LATCH	HANDLE,PP,FB44N	1	
M10	4713-001004	LAMP-INCANDESCENT	230V,-,40W,ORG,-,-,25x71mm	1	CV/AIR
M11	DE74-20015G	TRAY-COOKING	T6,PI318,1115G,MW5896W	1	
M12	DE92-90189P	ASSY-GUIDE ROLLER	MW5896W	1	
M13	DE67-60081A	COUPLER	PPS,-,-,-,3RD-1.0/1.3	1	
M14	DE71-60458A	COVER-AIR	PP(TB53),78G,-,-,WHT,3RD-1.0/1.3 MW5896W	1	
M15	DE26-00008A	TRANS-H.V	SHV-293EC,230V50HZ,2230V/3.15V,-,DY	1	⚠
M16	DE61-50106A	BRACKET-HVC	SECC,T0.8,W31,L125.8	1	
M17	2501-001107	C-OIL	1.1uF,2.1KV,BK,54x35x85,20mm	1	
M18	DE91-70063A	ASSY-HVD	V2M6,PI9.0,0.05MT	1	
M19	DE91-70061A	ASSY-H.V.FUSE	THV060T-0800-H,5KV/0.8A,WHT	1	
M20	DE61-40066A	FOOT	PP,BLK,-,-,3RD-W	2	
M21	DE31-10154A	MOTOR-SYNCHRONOUS	M2HJ49ZR02,ST-16,50/60HZ	1	
M22	DE80-10001F	BASE-PLATE	SGCC,T0.8,W345,L565,MW5896W	1	
M23	DE94-00154N	ASSY CONTROL-BOX	M1974R/BWT,WHT,3RD-1.0,FISH2,RUSSIA	1	⚠
M24		ASSY DOOR		1	S. N. A ⚠
M25	3601-000448	FUSE-FERRULE	250V,10A,SB,CERAMIC,6.35X31.8MM	1	
M26	DE27-10020C	COIL-CHOKE	TC-104,0.9UH*2,-,L31*W20*H32,-,ABS,AC250V/14	1	
M27	DE71-00015A	COVER-CEILING	T0.3,W114.2,L121.5,-,CE2933	1	
M28	DE63-90035G	CUSHION-RUBBER	DFA20,T2,W190,L100,BLK	1	HVT

● : Option Parts ⚠ : Warning ⚠ : Electrostatically Sensitive Devices

S. N. A : SERVICE NOT ASSEMBLY

7-3 Door Parts List

Ref. No.	Parts No.	Description	Specification	Q'ty	Remarks
D 1	DE64-20112D	HANDLE-DOOR	ABS(HR0370U),30G,WHT,-,M959	1	
D 2	DE01-00098A	FILM-DOOR	PET,T0.13,W22.6,L201.8,-,M959	1	
D 3	DE64-40263F	DOOR-A	ABS(HR0370U),160G,WHT,-,M959	1	
D 4	DE64-40265S	DOOR-SCREEN	SAN,A3RD-1.0,FISH2,M1914R/BWT,RUSSIA/CMO	1	
D 5	DE94-00075B	ASSY DOOR-E	3RD-1.0,BLK,COATING	1	
D 6	DE64-40012A	DOOR-C	RESIN-PP(TB53),T2.0,CE945GF,BL	1	
D 7	DE01-00118A	FILM-DOOR	T0.15,W304,L185,-,-,MW5896W	1	
D 8	DE61-70126A	SPRING-KEY	0.8,0,36,6,BLUING	1	
D 9	DE64-00028A	DOOR-KEY	POM,BLK,CE2974	1	

7-4 Control Parts List

Ref. No.	Parts No.	Description	Specification	Q'ty	Remarks
C 1	DE67-40145A	WINDOW-DISPLAY	ACRYL,T2,W40,L77,SMOG,30G	1	
C 2	DE71-00031Z	COVER-PANEL	ABS,M1974R/BWT,-,-,WHT,3RD-1.0 FISH2	1	
C 3	DE72-00052A	CONTROL-PANEL	ABS,M1974R/BWT,-,-,-,-,WHT	1	
C 4	DE66-00008H	BUTTON-DEFROST	ABS,-,-,WHITE,M1974R/BWT,RUSSIA	1	
C 5	DE66-20176E	BUTTON-SELECT-C	ABS(HR0370U),5G,-,WHT,M959	1	
C 6	DE66-20175E	BUTTON-SELECT-B	ABS(HR0370U),5G,-,WHT,M959	1	
C 7	DE66-20182J	BUTTON-START	ABS,-,2G,P/WHT,M1774,3RD FISH2	1	
C 8	DE64-10127B	KNOB-COVER	ABS(HR0370U),-,WHT(W9501),-,CE	1	
C 9	DE66-00007A	BUTTON-TRAY	ABS,-,-,WHT,10G	1	
C10	DE66-00010A	BUTTON-CANCEL	ABS,-,D16.3,WHT,5G	1	
C11	RC-F209-02	ASSY PCB PARTS	M1974	1	
C13	DE71-60378A	COVER-LAMP	POM,T2,W19.4,L27,3G,NTR,RE-446	1	

7-5 Body Latch Parts List

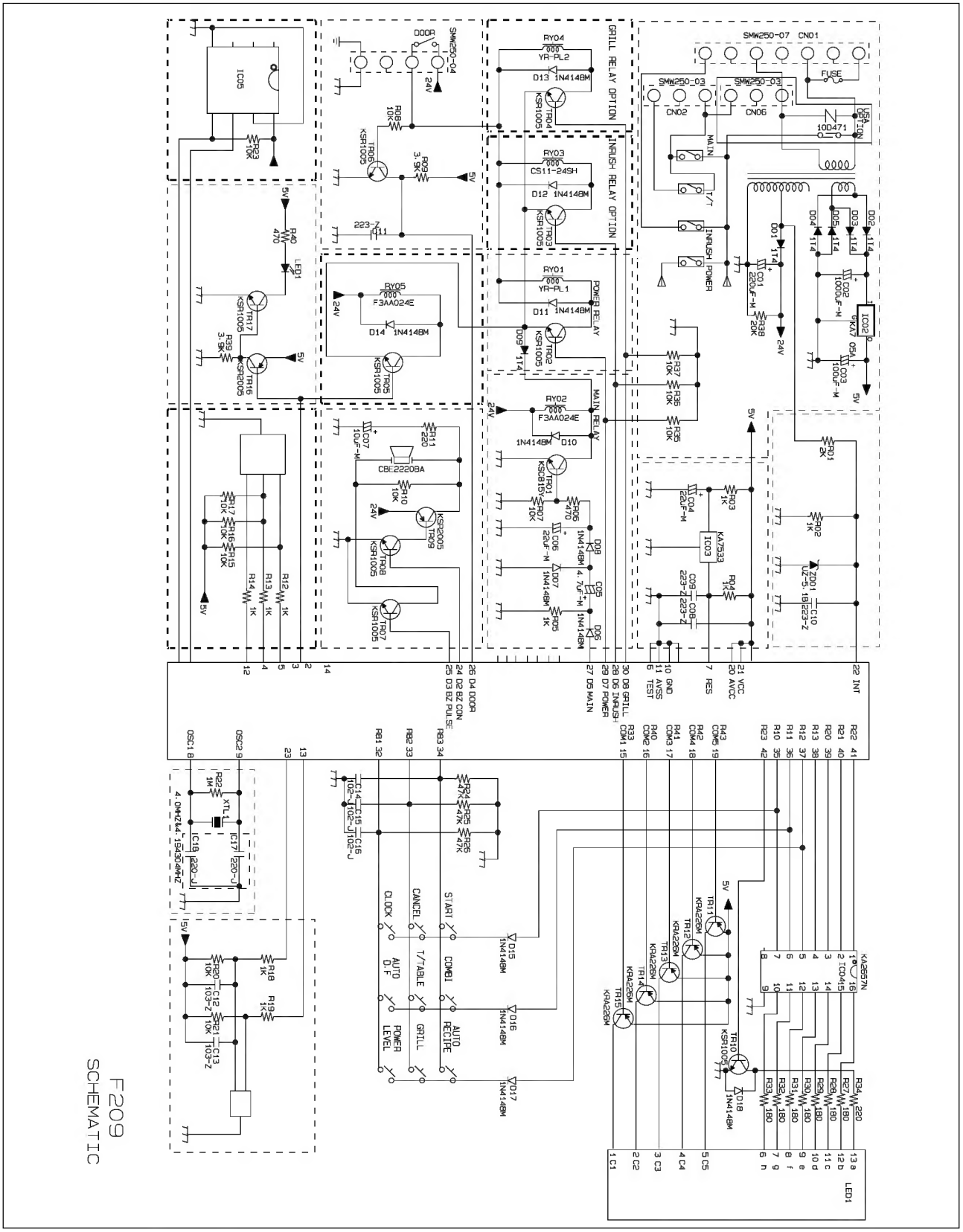
Ref. No.	Parts No.	Description	Specification	Q'ty	Remarks
B 1	DE66-40021D	LATCH-BODY	PP,HANDLE,FB44N	1	
B 2	3405-000178	SWITCH-MICRO	250V,15A,200gf,SPST-NO	2	
B 3	3405-000175	SWITCH-MICRO	250V,15A,200gf,SPST-NO	1	
B 4	DE66-90054C	LEVER-SWITCH	PP,-,-,-,-,-,-,HANDLE,FB44N	1	

7-6 Standard Parts List

Parts No.	Description	Specification	Q'ty	Remarks
DE60-10012A	SCREW-TAP TITE	TH,+,3,M4,L10,SWR10,ZPC2,TOOTH	1	N/F-EAR
DE60-10012A	SCREW-TAP TITE	TH,+,3,M4,L10,SWR10,ZPC2,TOOTH	1	P/C-EAR
DE60-10012A	SCREW-TAP TITE	TH,+,3,M4,L10,SWR10,ZPC2,TOOTH	1	PCB-EAR
DE60-10059A	SCREW-TAP TH	TH,M4,L8,SUS410,CR	2	C/CEILING
DE60-10080B	SCREW-WASHER	PH,PI5,L10,SWRCH18A,ZP2,2S	4	MGT
DE60-10080B	SCREW-WASHER	PH,PI5,L10,SWRCH18A,ZP2,2S	4	TNS-HV
DE60-10082H	SCREW-A	2S-4X12,TOOTHED	3	B-PLTE
DE60-10082H	SCREW-A	2S-4X12,TOOTHED	2	BD-LAT
DE60-10082H	SCREW-A	2S-4X12,TOOTHED	2	CN-BOX
DE60-10082H	SCREW-A	2S-4X12,TOOTHED	1	CV/AIR
DE60-10082H	SCREW-A	2S-4X12,TOOTHED	2	MO/FAN
DE60-10082H	SCREW-A	2S-4X12,TOOTHED	5	PN/OUT
DE60-10082H	SCREW-A	2S-4X12,TOOTHED	2	TCO
DE60-10098A	SCREW-ASSY TAP TITE	PH,TC,M4X8,SWRCH18A,ZPC2,GLD,W	2	M/DRV
DE60-10069A	SCREW-TAP TH	TH,M4,L10,FRFZY	1	DOOR-A
DE60-10088A	SCREW-TAP PH	PH,M3,L8,FEFZY,PLAIN	11	PCB
DE60-10098A	SCREW-ASSY TAP TITE	PH,TC,M4X8,SWRCH18A,ZPC2,GLD,W	1	-
DE60-10012A	SCREW-TAP TITE	TH,+,3,M4,L10,SWR10,ZPC2,TOOTH	1	B-PLATE

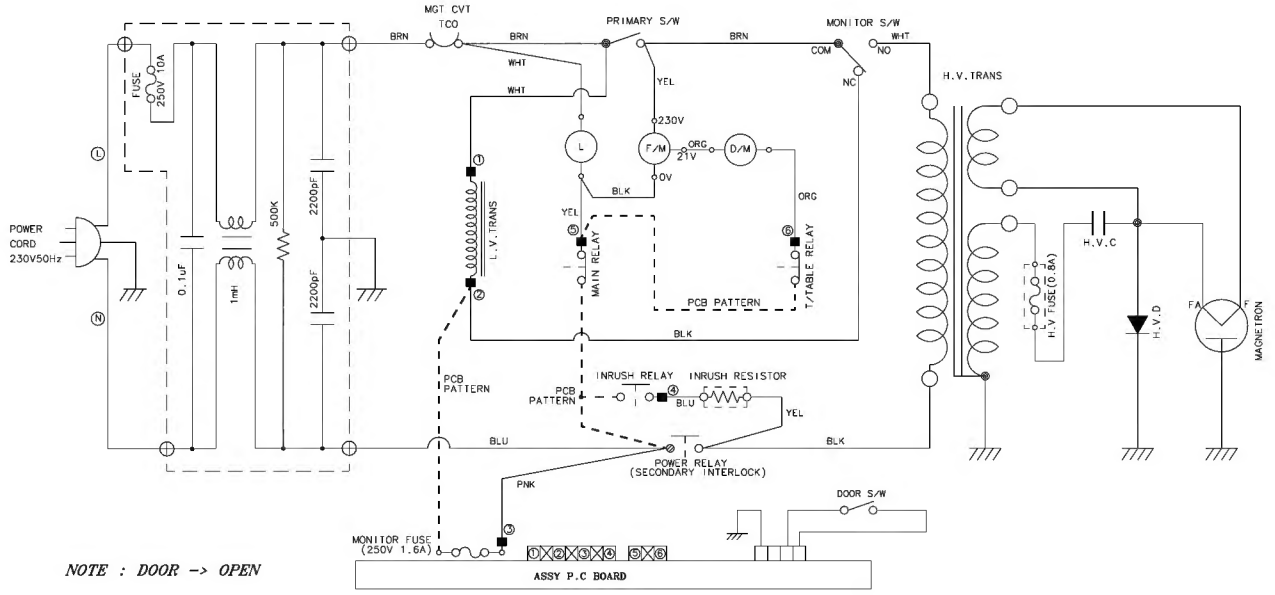
8. P.C.B Diagrams

8-1 P.C.B Diagrams



8-2 P.C.B Parts List

No.	Parts No.	Description	Specification	Q'ty	Remarks
P 1	0506-000180	TR-ARRAY	KA2657,NPN,7,1W,DIP-16,ST,1000	1	IC04
P 2	0703-001048	DISPLAY-LED	GRN,4digit,7seg,45.2x22.38x27.	1	LED1
P 3	3501-001050	RELAY-MINIATURE	24VDC,200mW,5A,1FormA,10mS,5mS	1	RY03
P 4	3501-001062	RELAY-POWER	24VDC,523.2mW,16A,1FormA,15mS,	1	RY01
P 5	3501-001155	RELAY-MINIATURE	24VDC,200MW,3000MA,1FORMA,10MS,10M	2	RY02,RY04
P 6	3601-001126	FUSE-FERRULE	250V,1.6A,FA,CERAMIC,5X20MM	1	FUSE
P 7	3708-001315	CONNECTOR-FPC/FC/PIC	12P,2mm,STRAIGHT,SN	1	CN04
P 8	DE09-00048A	IC-MCU	HD404316-E01S,M1774R/M1974R,4BIP,SDIP	1	IC01 ⚠
P 9	DE26-20146A	TRANS-L.V	SLV-745EN,230V,50HZ,AC17/7V	1	LVT1
P10	DE30-20016A	BUZZER	CBE2220BA,STICK	1	BUZ1
P11	DE34-20071A	SWITCH-ROTARY	DC10V,1MA,SH,PA-1005A-003-000	1	ECD1
P12	DE39-40723A	WIRE HARNESS	DC35V,C-959G,80mm,12PIN	1	CN05
P13	DE47-40024A	HOLDER-FUSE	FH-51H,7.5A	1	FUSE
P14	0401-001025	DIODE-SWITCHING	1N4148M,50V,450mA,DO-34,TP	6	D06,D07,D08,D10,D11,D12
P14	0401-001025	DIODE-SWITCHING	1N4148M,50V,450mA,DO-34,TP	4	D14,D15,D16,D17
P15	0402-001103	DIODE-RECTIFIER	1T4,400V,1A,TS-1,TP	7	D01~D05,D09,D19
P16	0403-000355	DIODE-ZENER	UZ5.1BSB,5.1V,4.97-5.18V,500mW	1	ZD01
P17	0501-000389	TR-SMALL SIGNAL	KSC815,NPN,400mW,TO-92,TP,120-	1	TR01
P18	0504-001014	TR-DIGITAL	KSR1005,NPN,300MW,4.7K/10K,TO-92,TP	6	TR02,TR03,TR05~TR08
P19	0504-001015	TR-DIGITAL	KSR2005,PNP,300MW,4.7K/10K,TO-92,TP	1	TR09,TR16
P20	0504-001044	TR-DIGITAL	KRA226M,PNP,400MW,2.2K/10K,TO-92M,TP	5	TR11,TR12,TR13,TR14,TR15
P21	0601-000261	LED	ROUND,RED,5mm,697nm	1	LED2
P22	1203-000429	IC-POSI.ADJUST REG.	78L05A,TO-92,3P,-,PLASTIC,4.6/	1	IC02
P23	2001≥, 09ø˘	R-CARBON	20KOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	R38
P24	2001-000032	R-CARBON	180OHM,5%,1/4W,AA,TP,2.4X6.4MM	7	R27~R30,R31,R32,R33
P25	2001-000034	R-CARBON	220OHM,5%,1/4W,AA,TP,2.4X6.4MM	1	R40
P26	2001-000290	R-CARBON	10KOHM,5%,1/8W,AA,TP,1.8X3.2MM	6	R07,R08,R10,R20,R21,R23
P26	2001-000290	R-CARBON	10KOHM,5%,1/8W,AA,TP,1.8X3.2MM	2	R35,R36
P27	2001-000429	R-CARBON	1KOHM,5%,1/8W,AA,TP,1.8X3.2MM	5	R03,R04,R05,R18,R19
P28	2001-000435	R-CARBON	1MOHM,5%,1/8W,AA,TP,1.8X3.2MM	1	R22
P29	2001-000515	R-CARBON	220OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	R11
P30	2001-000577	R-CARBON	2KOHM,5%,1/8W,AA,TP,1.8X3.2MM	2	R01,R02
P31	2001-000613	R-CARBON	3.9KOHM,5%,1/8W,AA,TP,1.8X3.2MM	2	R09,R39
P32	2001-000780	R-CARBON	470OHM,5%,1/8W,AA,TP,1.8X3.2MM	1	R06
P33	2001-000786	R-CARBON	47KOHM,5%,1/8W,AA,TP,1.8X3.2MM	3	R24,R25,R26
P34	2202-000127	C-CERAMIC,MLC-AXIAL	10nF,+80-20%,25V,Y5V,TP,-,7.5	2	C12,C13
P35	2202-000173	C-CERAMIC,MLC-AXIAL	1nF,10%,50V,Y5P,TP,1.9x3.5,-	3	C14,C15,C16
P36	2202-000807	C-CERAMIC,MLC-AXIAL	22nF,+80-20%,25V,Y5V,TP,3.5x19	4	C08,C09,C10,C11
P37	2401-000151	C-AL	1000uF,20%,25V,GP,TP,12.5x20,5	1	C02
P38	2401-000244	C-AL	100uF,20%,10V,GP,TP,6.3x7,5	1	C03
P39	2401-000466	C-AL	10uF,20%,35V,GP,TP,5x7,5	1	C07
P40	2401-000914	C-AL	22uF,20%,16V,GP,TP,5x11,5	2	C04,C06
P41	2401-002075	C-AL	4.7uF,20%,50V,GP,TP,5x11,5	1	C05
P42	2401-002598	C-AL	220uF,20%,50V,GP,TP,10x16,5	1	C01
P43	2801-003214	CRYSTAL-UNIT	4.194304MHz,50ppm,28-AAA,12pF	1	XTL1
P44	3404-001022	SWITCH-TACT	15V,20mA,130°æ40gf,6x6x5mm,SPS	1	SW01,SW02,SW03,SW04
P44	3404-001022	SWITCH-TACT	15V,20mA,130°æ40gf,6x6x5mm,SPS	5	SW05,SW06,SW07~SW09
P45	3711-000940	CONNECTOR-HEADER	BOX,4P,1R,2.5mm,STRAIGHT,SN	1	CN03
P46	3711-004143	CONNECTOR-HEADER	BOX,2P/3P,1R,5mm/2.5mm,STRAIGH	1	CN02
P47	3711-004200	CONNECTOR-HEADER	BOX,5P/7P,1R,2.5MM,STRAIGHT,SN	1	CN01
P48	DE13-20009A	IC	KA7533,DIP	1	IC03
P49	DE39-60001A	WIRE-SO COPPER	PI0.6,SN,T,52MM,TAPING_WIRE	6	J01,J02,J03,J04,J06,J07
P49	DE39-60001A	WIRE-SO COPPER	PI0.6,SN,T,52MM,TAPING_WIRE	7	J08,J09,J10,J11~J14

9. Schematic Diagrams

9-1 Schematic Diagrams